INDUSTRI Hijau

Ke Arah Masa Depan yang Rendah Karbon

Green INDUSTRY

Towards Low Carbon Future

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PROGRAM LATIHAN PENGELUARAN Bersih Kepada Perusahaan Kecil dan Sederhana (PKS)

ke arah Pembangunan Premis Demonstrasi Amalan Industri Hijau

Selari dengan keperluan semasa pada tahun 2013, program audit pengeluaran bersih yang telah dimulakan oleh Jabatan Alam Sekitar sejak tahun 2009, telah diberi imej dan pendekatan baru.

Ianya bukan hanya sekadar penukaran tajuk baru program, malah terdapat juga suntikan elemen dan penambahan aktiviti baru bagi memperkasakan program sedia ada. Pada tahun 2013, program ini dikenali sebagai Program Latihan Pengeluaran Bersih (CP) Kepada Perusahaan Kecil dan Sederhana (PKS) ke arah Pembangunan Premis Demonstrasi Amalan Industri Hijau menggantikan nama Program Bantuan Audit Pengeluaran Bersih Kepada IKS yang digunakan sebelum ini.

Program yang juga secara ringkas dikenali Program Latihan CP kepada PKS mengambil pendekatan mesra industri supaya mudah diterima dan mendapat sambutan oleh pihak industri terutamanya PKS. Aspek latihan juga merupakan elemen baru program ini di mana tujuannya adalah untuk meningkatkan pengetahuan pekerja PKS berkaitan Pengeluaran Bersih yang merupakan salah satu amalan Industri Hijau yang telah dipraktikkan oleh lain-lain negara maju. Aspek latihan ini penting

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MAKLUMAT OPERASI MEJA BANTUAN:-

Mula Operasi	: 15 April 2013
Hari Operasi	: Isnin-Rabu
Masa Operasi	: 9.00 pagi – 12.00 tgh

Sila Hubungi:-

Nombor Telefon	: 03-88712036
Nombor Faksimili	: 03-88810920

Kandungan | *Contents*

DARI MEJA Pengarang

Assalamualaikum dan salam sejahtera,

Syukur Alhamdulillah ke hadrat Ilahi kerana dengan limpah kurniaanNYA, dapat kita bertemu kembali dalam Buletin Pengeluaran Bersih Edisi 1 bagi tahun 2013.

Fokus buletin kali ini adalah berkaitan Inisiatif Industri Hijau Jabatan Alam Sekitar melalui Unit Industri Hijau dimana di muka hadapan buletin memaparkan maklumat berkaitan Program Latihan CP Kepada PKS dan juga penubuhan Meja Bantuan Industri Hijau (*Green Industry Helpdesk*). Meja Bantuan Industri Hijau adalah usaha berterusan Jabatan Alam Sekitar untuk memberi khidmat nasihat berkaitan amalan industri hijau kepada pihak industri bagi meningkatkan pelaksanaan amalan industri hijau di Malaysia dan seterusnya meningkatkan pematuhan kepada Akta Kualiti Alam Sekeliling 1974 manakala halaman belakang pula memaparkan aktiviti-aktiviti Jabatan Alam Sekitar dan Unit Industri Hijau.

Paparan khas bulletin kali ini adalah bertemakan pelaksanaan Pengeluaran Bersih di beberapa negara di dunia dipaparkan bermula dengan negara kita sendiri di Malaysia melalui artikel Cleaner Production Implementation for SMEs in Malaysia yang mengandungi beberapa kajian kes dari industri kecil dan sederhana di Malaysia. Ini diikuti dengan pelaksanaan Pengeluaran Bersih di peringkat antarabangsa melalui artikel Cleaner Production Practices around the World yang menerangkan dengan lebih mendalam mengenai Pengeluaran Bersih dan juga amalan Pengeluaran Bersih.

Buletin kali ini juga memaparkan tentang Pertumbuhan Hijau atau lebih dikenali sebagai Green Growth yang merupakan salah satu solusi untuk menangani isu Pencemaran Alam Sekitar yang sering menjadi perbualan dan sedang hangat dibincangkan. Dua artikel berkaitan Pertumbuhan Hijau disediakan berasaskan laporan oleh Organisation for Economic Cooperation and Development (OECD) dikongsi. Artikel pertama ialah Putting Green Growth at the Heart of Development, disusuli dengan artikel Green Growth Agenda for Developing Countries. Artikel A Growing Green Community turut diselitkan yang mengandungi fakta-fakta menarik mengenai isu alam sekitar di dunia dan juga dalam Malaysia serta langkah-langkah yang diambil oleh pihak kerajaan dalam mempromosi pelaksanaan Pertumbuhan Hijau di Malaysia.

Isu Perubahan Iklim atau Climate Change masih menjadi tumpuan utama warga dunia. Dengan itu buletin ini turut memuatkann 2 artikel berkaitan isu Perubahan Iklim iaitu Kitar Semula: Pemangkin Lestari Bumi Hijau dalam menangani Perubahan Iklim yang mengutarakan isu pemanasan global dan kaitan dengan amalan kitar semula yang dapat mengurangkan masalah pemanasan global. Selain dari itu, artikel The Importance of Ocean in Controlling Global Climate Change – The Perspective of CO_2 uptake membincangkan peranan besar yang dimainkan oleh laut dalam mengawal perubahan iklim dan pemanasan global dan artikel bertajuk A Growing Green Community memaparkan peningkatan kesedaran masyarakat di seluruh dunia dan Malaysia khususnya kepada amalan hijau (*green practices*).

Ruangan ulasan buku berjudul Pollution Prevention terbitan American Institute of Chemical Engineers membincangkan tentang keberkesanan metodologi serta amalan dan teknologi kejuruteraan yang boleh dipraktikkan oleh pihak industri dan agensi kerajaan yang terlibat menuju ke arah pencegahan pencemaran alam sekitar.

Akhir kata, semoga para pembaca akan memperoleh manfaat dari artikel-artikel yang dipaparkan dan bersama-sama menangani isu alam sekitar demi kesejahteraan bersama.

PROGRAM LATIHAN PENGELUARAN Bersih Kepada Perusahaan Kecil dan Sederhana (PKS)

ke arah Pembangunan Premis Demonstrasi Amalan Industri Hijau

Aktiviti Pra-Lawatan Program Latihan CP kepada PKS

supaya pihak premis dapat meneruskan aktiviti program secara kendiri selepas program bersama perunding tamat dan seterusnya dengan mudah dapat mencapai matlamat untuk meningkatkan pelaksanaan amalan Industri Hijau di kalangan PKS di Malaysia. Di samping itu, PKS juga akan memperolehi banyak faedah menerusi pelaksanaan amalan Industri Hijau secara berterusan di premis mereka seperti berikut:

1) Meningkatkan daya pengeluaran syarikat.
2) Meningkatkan ekonomi dan pendapatan syarikat.
3) Melahirkan PKS yang berdaya saing.
4) Meningkat imej syarikat.
5) Membantu meningkatkan kualiti alam sekitar secara berterusan.
6) Menghasilkan produk yang lebih berkualiti dan selamat.
7) Mengurangkan risiko kemalangan di tempat kerja.

Selain daripada aspek latihan, melalui program ini juga, garis panduan amalan industri hijau mengikut sektor spesifik akan diterbitkan. Garis Panduan ini akan menjadi rujukan kepada PKS dalam sektor berkenaan untuk melaksanakan CP secara kendiri.

Sebagai permulaan pada tahun 2013, sebanyak 10 buah premis PKS di sekitar Lembah Kelang telah dipilih bagi menjalani Program Latihan CP dengan keutamaan kepada industri percetakan dan sadur elektrik. Selain dari itu, sebanyak 2 garis panduan amalan industri hijau bagi setiap sektor industri terbabit akan diterbitkan untuk rujukan dan panduan semua PKS lain dalam sektor yang sama untuk melaksanakan CP secara kendiri.

Sementara itu, mana-mana premis yang telah melaksanakan opsyen CP dengan jayanya selepas program berakhir akan turut dijadikan premis demontrasi CP sebagai contoh kepada premis-premis PKS yang lain.

Bagi memastikan kesinambungan program Latihan CP kepada PKS, Meja Bantuan Industri Hijau (MBIH) atau *Green Industry Help Desk* telah ditubuhkan di Ibu Pejabat Jabatan Alam Sekitar dan beroperasi di Unit Industri Hijau.

Meja Bantuan Industri Hijau (*Green Industry Helpdesk*)

Tujuan Meja Bantuan ini disediakan adalah untuk menjadi pusat rujukan yang utama berkaitan Industri Hijau dan inisiatif-inisiatifnya di Malaysia. MBIH ditubuhkan untuk fungsi-fungsi berikut:-

1. Menyebar maklumat berkaitan Industri Hijau dan manfaatnya kepada industri di Malaysia.
2. Memberi khidmat nasihat berkaitan amalan Industri Hijau kepada industri di Malaysia khususnya Perusahaan Kecil Dan Sederhana (PKS).
3. Memberi maklumat berkaitan inisiatif-inisiatif Industri Hijau yang dilaksanakan oleh Jabatan Alam Sekitar dan lain-lain agensi.
4. Memberi panduan kepada pihak industri bagaimana untuk melaksanakan inisiatif industri hijau iaitu Pengeluaran Bersih dan faedah-faedah yang boleh diperolehi melalui amalan Pengeluaran Bersih.

CLEANER PRODUCTION **IMPLEMENTATION FOR** SMEs IN MALAYSIA

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SMALL AND MEDIUM ENTERPRISE IN MALAYSIA

Small and medium enterprises are recognized as major contributors to economic growth in Malaysia. According to the Department of Statistics in 2010, SMEs make up 97.3 % of companies operating in Malaysia. SMEs comprise three key economic sectors, which are manufacturing, services and agriculture.

Rapid industrialization without environmental consideration by the SMEs has resulted in increased generation of waste and pollutants. Among the activities that threaten the environment, related to SMEs include dumping waste directly into the river, open burning and the release of toxic gases. In addition, the use of excessive water and energy without monitoring also contribute to the increased cost of providing utility supply. Global warming and ozone depletion are the most significant impacts due to poor waste management.

POLLUTION PREVENTION TOOL

In keeping with the goals for sustainable development, better approaches of pollution prevention are necessary and relevant. Cleaner Production (CP) is a multidimensional pollution prevention approach (Fig. 1).

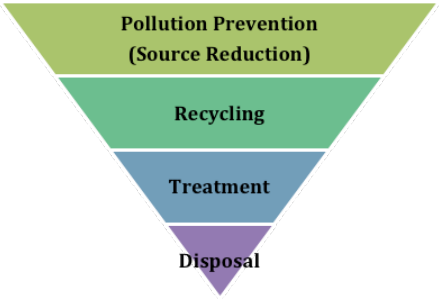


Fig. 1 Environmental Management Hierarchy

The highest priority in the hierarchy is preventing pollution through source reduction. Source reduction avoids the generation of waste and reduces the cost of collecting, storing and treating the waste. These activities aim towards sustainable production.

CP AUDIT-CASE STUDY

The Cleaner Production audit is an exercise to identify material and energy use and waste generation associated with different process activities. The audit outcome provides a basis for generation of options for pollution prevention, reduction of use of energy, water and material resources and minimise waste, profitably and without reducing production capacity for the selected SMEs in Malaysia. In Malaysia CP program was implemented by Department of Environment as lead agency and collaboration with consultant such as SIRIM Berhad and University Malaya Consulting Unit (UPUM). Below are examples of SME participated in CP program with some proposed CP options.

COMPANY A

Company A is located in Negeri Sembilan. The company produces noodles with the monthly production capacity of about 15 tons. The main raw materials for producing the products are rice, starch, wheat flour and corn flour.

Findings & Options

(1) Mixing the dough manually without wearing gloves (Fig.2).

Install automated system and wear gloves to increase daily capacity demands and at the same time improve sanitation (Fig. 3).

COMPANY B

Company B is located in Perak. The nature of business is extracting fibre from oil palm fruit. The fibres are then processed, whereby long fibre is their final product which is exported to China for mattress processing.

Findings & Options

(1) Final product experienced high moisture content. CP option is to install new drying system with enlarged the drying area (Fig.4).

Fig 4: CP option at drying system

(2) Insufficient lighting in product storage area (Fig. 5).

Fig 5: Current Practice

Fig 6: Proposed CP Option

To install additional transparent rooftop to allow maximum lights entering to storage area (Fig. 6).

COMPANY C

Company C is located in Johor. The main products are fish ball and fish cake. They also produce various frozen foods for *yong tau fu* and steamboat.

Findings & Options

(1) Products not dried homogenously by using high wattage lamps and heating coils (Fig. 7)

Fig 7: Current Practice

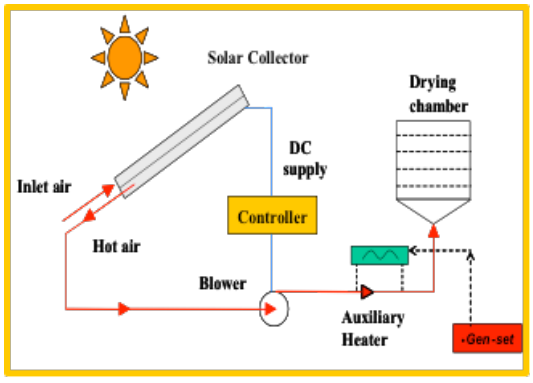


Fig 8: Proposed new drying system

The proposed CP option is to install solar dryer system to enhance drying process (Fig. 8).

(2) Products cooling using electrical fans. The Proposed CP option is to install food-cooling conveyor to accelerate cooling process and improve quality and hygiene of products (Fig. 9).

Fig 9: CP option at cooling process

COMPANY D

Company D is Located in Pulau Pinang. They are producing canned fish product from sardine and mackerel.

Findings & Options

(1) Solid waste is collected using plastic basket at drainage line (Fig. 10).

Fig 10: Current Practice

To install wire mesh basket that can substantially reduce waste load to primary treatment and also avoid the likelihood of blockages in pumps and pipes (Fig. 11).

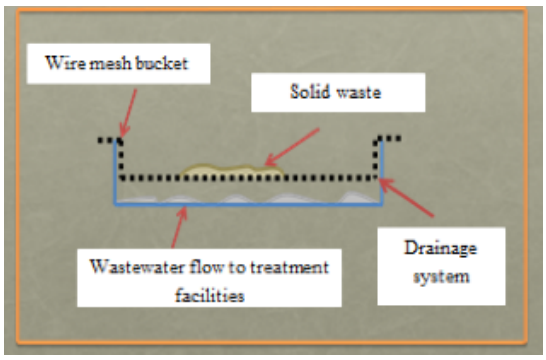
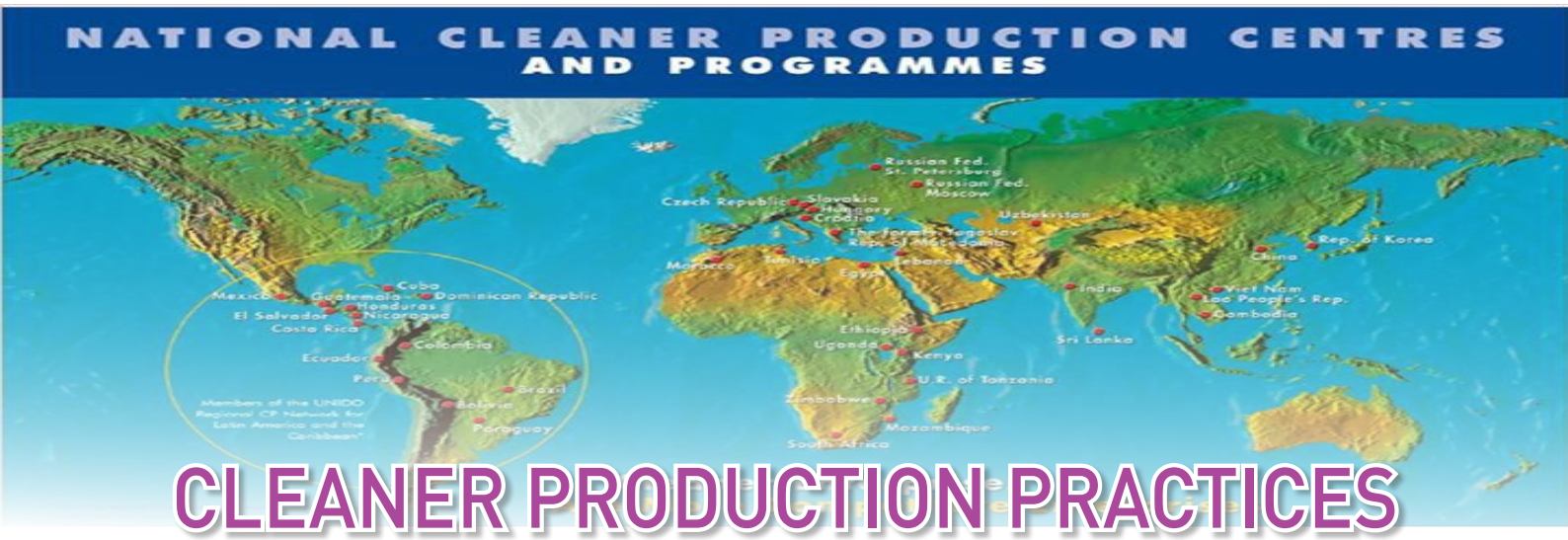


Fig 11: Proposed CP Option



CLEANER PRODUCTION PRACTICES Around the World

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Scenarios in Asian Countries

Asia's major economies have begun to respond to the global issues seriously, especially towards climate change and also regional pollution. The positive trends prove an increased awareness in Asia, of integrating the importance of environmental sustainability together with the social development and their long-term economic plan.

CP, as the environmental preventive practice and win-win approach, came into **China** systematically from the 1990s. In response to the United Nations Conference on Environment and Development in 1992, China has devoted herself fully to the sustainable development strategy including the preventive CP approach. In China's **Agenda 21** published in 1994, CP was further regarded as the key strategy for achieving national goals of sustainable development, from which CP was introduced in China and began to be implemented in industrial sectors, though mostly as demonstration projects. The **China National Cleaner Production Center (CNCPC)** was established in December 1994 and had been working hand-in-hand with different sectors e.g. chemical industry, brewing, building materials, fertilizer and textile since then.

As a case study in **Japan**, the government is currently promoting a **biofuel program** in order to combat the environmental and energy security problems and at the same time improving the rural development. At present, although the verification tests and large scale projects for biofuel production have been launched, the main obstacles are high production costs and conflict with human food security and feed security for domestic animals. The most crucial task that the government needs to take into consideration is to develop sustainable mechanisms that will measure **Greenhouse Gas (GHG) emissions**, determine their impacts to the ecosystem, food security, highlight social impacts, and reduce production costs, particularly for bioethanol.

Korea's petrochemical and steel industries have increased pressure on GHG emissions level in Asia. Basically, there are three technology strategies in reducing GHG emissions: wait-and-see, in process-focused and all-round strategies. However, all these strategies need to be reviewed and are expected to change in parallel with the increasing demand for new energy sources and new raw materials in the market. Various firms also need to be regularly informed with effective GHG emission options such as treatment-reliance, in-bound substitution and all-round strategies. Hence, GHG mitigation efforts have become one of the most relevant policy issues in Korea. For instance, in terms of water resource management, everyone in Korea has a right to get full access on water quality information regardless of their background level and interest on this matter.

Since the 1990s, **Vietnam** has emerged as Asia's fourth largest in **motorcycle industry** after China, India, and Indonesia. Japanese firms such as Suzuki, Honda and Yamaha are playing major roles in determining the market in Vietnam. However, as the demands for the motorcycle continue to increase, so do issues related to motorcycles production. Factors such as market demand characteristics, firm performance, and information access to green products developments should also be highly considered. In order to curb industrial pollution and gather effective cooperation from industries, specific and operations-based environmental policies should be developed. Among others, **stricter emission discharge standards, higher emission discharge taxes and sustainable consumption and production policies** could be implemented since such methods have been proven to be successful in mitigating industrial pollution in certain countries.

Experience and Success Stories from Norwegian Model

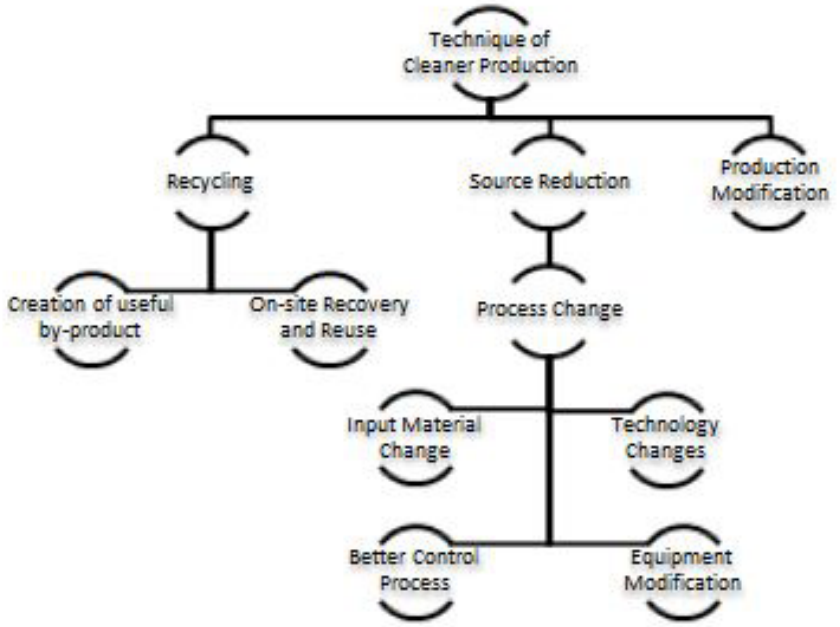
The Norwegian method originated from Norwegian State Pollution Control Authority. Norway demonstrated a program named Norwegian model. It is a baseline model emphasis on contribution for the achievement of national environmental goals regarding reductions of major pollutants. The Norwegian method or

cleaner production has been practiced for over 12 years. Quantifiable results in terms of reduced wastes and emissions, improved material and energy efficiencies, have resulted in the enhancement of streamlined cleaner production and with experience over time, the model has been refined and improved. Continual use of the Cleaner Production concept by this model over the last 12 years has proven that Cleaner Production can be an efficient tool in conserving resources and reducing emissions.

Manufacturers implementing the Norwegian Model learned that, it is important to have modern and efficient processes. However, investing in new technology is costly and the funds may not be readily available for the manufacturer. Nevertheless, the Norwegian Model shows that it is possible to obtain substantial economic savings and at the same time reduce emission, if one follows to certain methodologies. Today, manufacturers that implement Norwegian model has reputed improvements in the following areas:

- Improved material utilisation (eco-efficiency)
- Lowered specific energy consumption and reduced production of greenhouse gases
- Reduced emissions to air, water and soil
- Reduced use of toxic materials in production and in products
- Reduced amount of waste to landfill reaching basic capacity level

Lessons learnt from implementing the Norwegian model is that, efficient and environmentally friendly production is not just a question of technology but equally important are people, skills, experience, motivation, systems, and organisation to achived an effective yet significance to improve a system of a industry



Cleaner Production Technique

Source: Cleaner Industrial Production Practice in Ethiopia: Problems and Prospects (1999)

Success Stories from Ethiopia

Achieving prosperity has been a long trend in economic development, followed by consumption of a large percentage of available resources. The Federal Democratic of Ethiopia is among the fastest growing non-oil-dependent country in the world. In order to achieve a stable economic trend, policies relating to the environmental problems and depletion of natural resources must be implemented and enforced

Ethiopia has established Ethiopian Cleaner Production Center (ECPC) whose focus is to give priority to any Small and Medium Enterprises that have significant impact on economic growth and export earning as well as showing high potential for CP and the transfer of Environmentally Sound Technologies. The ECPC has conducted training for sectors such as Food and Beverages, Textile, Tannery, Chemical, Building and Construction, Metal Engineering, Pulp and Paper, and also Civil Organisation and association.

Despite the efforts done by Ethiopia to implement Cleaner Production, there are challenges in their steps toward the implementation of Cleaner Production in their country. These challenges include absence of a clear and transparent CP policy, lack of process control instrument, Obsolence of technologies, as well as lack access towards CP implementation information.

However, Ethiopia also records some achievement in their process towards Cleaner Production such as national capacity development, CP awareness among community, waste audit data, formation of CP association, National Center for Cleaner Industrial Production which monitor the CP practice in industries and waste reduction project.

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Putting Green Growth at the Heart of Development

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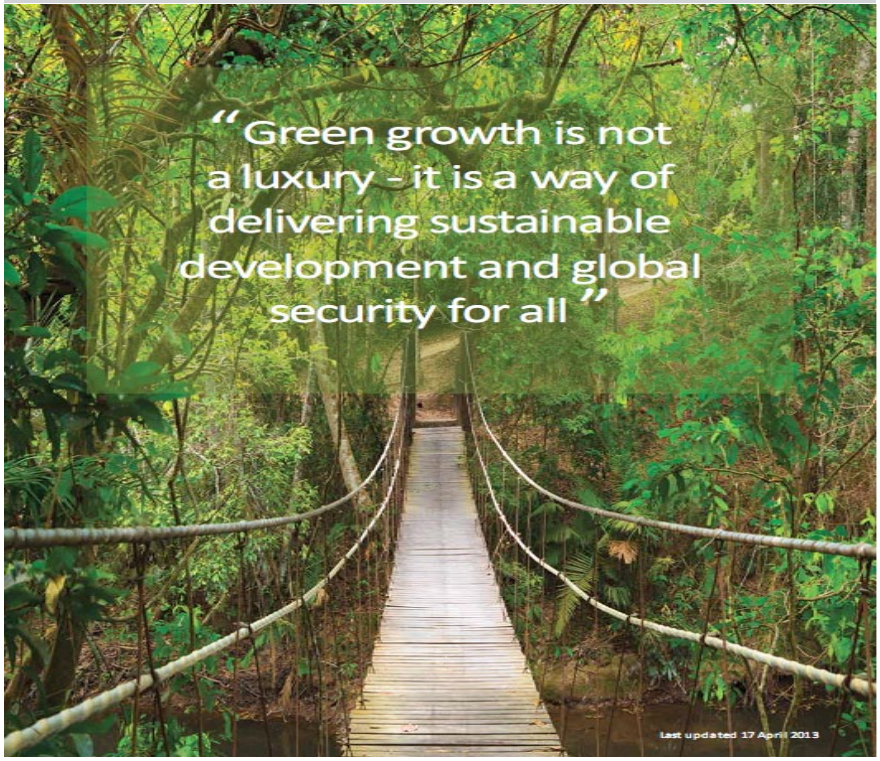

(This article is adapted from OECD Report Series on Green Growth, 2011)

The Scene:

According to UNEP Report (2011) , in the 20th century the world's population increased four-fold, economic output by 22 and fossil fuel consumption by 14 times. This scenario inevitably means the resilience of a wide range of socio-economic and environmental systems is now being tested by the needs of a rapidly growing global population and with it increased levels of economic activities. It is recognised that the key challenges will be providing securities in water, food and energy of the projected 9 billion people by 2050 and ensuring a clean and healthy living environment for all.

The foresight studies by OECD presented in its Environment Outlook 2050 Report predict that failure to adjust to economic growth to avoid environmental risks will lead to large costs and potentially irreversible consequences. Human health and well-being will be greatly compromised while the potential for sustainable development is at risk and sadly, the most severe and dramatic effects will be felt by the developing countries. It is also imperative to note that the gap in global GDP between the developed and the developing world remains and (UNCTD, 2012).

The Economic Proposal

Reconciling development with environmental protection and sustainable resource management is considered critical to avoid natural capital depletion, climate change and social insecurity. This action is particularly relevant for developing countries due to their acute exposure and vulnerability to environmental risks such as air, water and soil pollution and their strong dependency on natural resources for economic growth. Thus governments that put green growth at the heart of development can meet the sustainable development agenda; economic growth and social stability, safeguarding the environment and conserving resources for future generation.

So, What is Green Growth?

Green Growth presents a new approach to economic growth that puts human well-being at the centre of development, while ensuring that natural assets continue to provide the resources and environmental services to support sustainable development (OECD, 2011a). By explicitly accounting for the environment and the value of natural assets, green growth expands traditional definitions of wealth to include well-being and the quality of growth and development.

Green growth does not replace sustainable development; rather it's a means to achieve it. The concept of green growth is more focussed in scope and provides a policy agenda that can help concretise and measure progress at the interface of economy and the government.

Green growth promotes a cost-effective and resource efficient approach of guiding sustainable production and consumption choices. When designed to reduce poverty and manage near-term trade-offs, green growth can help developing countries to achieve sustainable development.

Pursuing Green Growth

It is readily conceded that a policy that integrates the two 'Es': Economy and Environment is easier said than done. It takes real leadership to instil change, a common vision of the future and solid co-operation among the stakeholders, ranging from various ministries and levels of government. It involves management and reconciliation of trade-offs in the short and long term. Some trade-offs may be worth taking, while others may cause irreversible and regrettable losses. Green growth is not about environmental preservation. It is a about a no-regrets approach for securing the natural resources needed to make development sustainable in the long run. Do we have a better option?

GREEN GROWTH AGENDA for Developing Countries

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Pursuing green growth in developing countries may pose challenges relating to the possible undermining of their short-term economic growth and development. Issues that could arise on poverty and inequality requiring targeted policies to avoid negative effects on the poorest, weak capacity and resources for innovation and investment, urgent need for rapid development, and few mechanisms to ensure those who protect natural assets receive sufficient incentives to maintain them. The characteristics and priorities of developing country economies will call for a different sequencing and mix of policy instruments than for developed countries in any effort to achieve greener growth. Support from the international community in terms of finance, technology and trade can provide the incentives and political momentum for moving forward.

Policy implementation in developing countries must be broad enough to show improvement in economic and environmental outcomes across the developing world. Developing countries need to take full ownership of the transformative agenda, recognize and exploit untapped opportunities, and mobilize relevant ministries to mainstream green growth objectives and policies into every government department and national budgets.

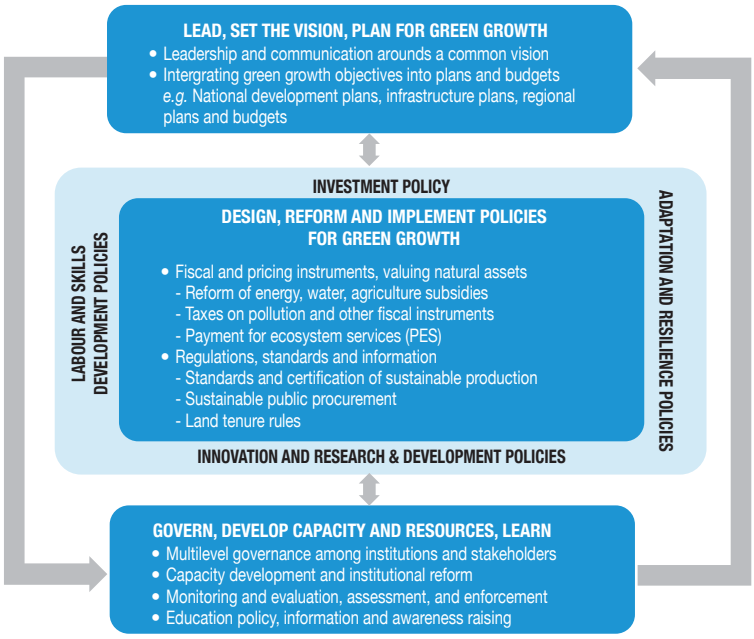

Fig.1: An agenda for national action on Green Growth in developing countries

The OECD Summary for Policymakers proposes a practical 3-step agenda (see Figure 1) for action, which begins with establishing national leadership, a vision and strategic plans for green growth that are critical to mainstream green growth objectives into existing priorities in partnership with public, private and civil society stakeholders. This involves goal-setting and integrating green growth considerations into existing planning processes, such as national development plans and budgetary systems. Strategic environmental assessment and public environmental expenditure reviews are two policy instruments that have proven useful in integrating green growth into development, infrastructure and budgetary planning process.

Leadership and strategic planning have to be supported by the strengthening of governance, capacity (including human resource) and resources for learning and sound decision making to monitor, implement and enforce green growth policies effectively. Mechanisms are needed for broad multilevel governance and stakeholder engagement, education and raising awareness, compliance and enforcement capacity, monitoring and assessment.

The central step in the proposed agenda is to design, reform and implement policies that stimulate green growth -- policies that broadly value natural assets and align incentives with green growth policy goals. Relevant policy instrument include reforming energy, water and agriculture subsidies, taxing air and water pollution, placing royalties on mineral extraction and payments for ecosystem services. In addition, standards and certification of sustainable production, sustainable public procurement, and clear land tenure rules. These are encapsulated by cross-cutting policies to stimulate green growth in a systemic way, namely policies on investment, innovation and research, labour skill, and resilience and climate adaptation.

Successfully shifting to a model of growth that sustains natural assets over time will require the engagement of all countries. The international community can play a crucial role in helping developing countries make the shift, especially by providing assistance to manage the short-term trade-offs of going "green". Recognizing developing country concerns that implementing green growth will be expensive, international co-operation can also ensure access to external and domestic sources of green financing and investment, technology and innovation, and facilitate trade in green goods and services. Donors fundamentally need to integrate green growth into all development co-operation activities, and ensure they support partner countries in their pursuit of specific green growth goals.

Adapted from "Putting Green Growth at the Heart of Development", OECD Report 2011

A Growing Green Community

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Green living has been a term that has been thrown about for the past decade. Coming into the 21st year anniversary of the first Earth Summit, has the concept of sustainability really sunk into society?

Source: www.unesco.org.uk

Source: www.kimharding.net

Source: www.bestecoshop.com

Across the globe, motivated by their pledges or the promise of economic opportunity from jumping on the bandwagon of a growing green industry, governments have been increasing and diversifying ways for their own organizations to be environmentally-friendly. Industries, too, have likewise responded. In fact, the biggest steps in carbon neutralization have been made by private industry. However, in order for the 'green revolution' to maintain its momentum through the coming years, it is imperative that individuals and communities begin to absorb green practices into their daily lives.

According to the US Environmental Protection Agency (US EPA), the estimated average annual household carbon footprint is 10378 kg CO_2. Delving in deeper, a study done by the US Energy Information Administration in 2010 on carbon dioxide emissions from the consumption of energy shows that the average Malaysian emits 6400 kg CO_2, in comparison to the global average of 4600 kg CO_2. This number is notably higher than that of our neighbours: The Phillippines (900 kg CO_2), Indonesia (1600 kg CO_2) and Thailand (4200 kg CO_2). On the bright side, the average amount of carbon dioxide released per person in Malaysia is far less than that released by the average Singaporean (36600 kg CO_2). Even so, there is much to consider in terms of how involved individuals of our community are when it comes to reducing their carbon footprint.

Looking exclusively at the numbers, it does not seem like society has really caught on to the idea of 'living green'. For example, did you know the government is offering a premium rate to those who sell solar power-generated electricity back to the grid? Currently the rate is RM1.30-RM1.40/kWh, with additional subsidies offered for solar panels installed in different configurations. This means that, if your house uses about 2 kWh-1 electricity every month, and you install solar panels that can generate up to 2 kWh-1 electricity, you will offset your electricity bill by around RM300 (assuming continuous sunlight of 10 hours; TNB rate of RM0.40/kWh; not including installation and maintenance costs). This premium rate is dealt out in quotas, one for the industry and one for residences. According to a talk by Alliance Bank on solar panel financing, the industry quota has been taken up. On the other hand, the quota for residences has barely been touched. Sounds like a big opportunity lost, but perhaps the initial investment cost is a big hurdle to this being a common practice in households.

Let us look at more accessible green practices, like recycling. According to the National Department of Solid Waste Management, the current recycling rate in Malaysia is 5%. This is a pitiful figure, considering the government had introduced its recycling campaign way back in the late 1980s; even more so when the government spends up to 60% (around RM70 million) of its recycling programme budget every year on raising awareness.

But all is not lost. Recently, more progressive measures are being applied at the municipal level. Most notable is the the effort by the Ministry of Energy, Green Technology and Water in creating 'Eco Towns'. Modelled after the 'Eco Town' in Kitakyushu, Japan, part of the concept of this town is diverting the area's waste from the landfill, towards the creation of useful products. For example, the 'Anaerobic Digestion of Kitchen Waste' project at Pasar Sri Serdang calls for residents in the Serdang neighbourhood to deliver their biodegradable waste to Pasar Sri Serdang, where the waste will be broken down in an anaerobic digestion process to produce methane. Meanwhile, in the Gombak area, residents are encouraged to bring their waste cooking oil to a center which converts the oil through distillation into biodiesel.

Children taking part in the Feed-the-Fish programme in One Utama. Source: The Star Online

Going around town, several establishments have begun to incorporate green practices into their businesses. For example, One Utama has complemented its single all-in waste bin with a separate bin for recyclables. Calling itself Malaysia's first Eco-Mall, One Utama has quite a few 'Go-Green' campaigns, mainly targeted at raising awareness and funds for forest and wildlife conservation. It is also interesting to see green practices done by small organizations hosting events: like how Peace Meal organizes carpooling for the participants of its book talk. My favourite eco-friendly organization so far, is the Free Tree Society, a charity organization which aims to educate suburban communities of the importance of trees by giving out free seedlings!

Asking around in my own community I found many instances where individuals have gone the extra mile to promote sustainability. Take for example, the PTA president of SK Damansara Jaya 2, Mr. Nasuruddin Aidid. The school had recently won the 'Kidzania's Kids for a Greener World Interschool Competition 2013' with simple initial steps like changing their incandescent light bulbs to the more energy-saving LED light bulbs. Changing light bulbs may sound like an insignificant thing, but changing from incandescent light bulbs to LED light bulbs means using up only 10% of CO_2, sulfur oxide and high-level nuclear waste emitted by incandescent light bulbs. Besides that, LED light bulbs use only 10% of incandescent wattage to produce the same amount of lumens- a fact that would surely make a big difference in your electricity bill. From this,

The card given out during Peace Meal events o encourage carpooling. These are recycle for future events

out in the open. Surprised by the amount of rainwater he collected, Mr. 'Arif says he now uses the water for gardening, and when there is some excess, for ablution. Regardless of the reason for which these residents began their practices, it is these small steps that will be the beginning of bigger things.

Achieving awareness at a grassroot level will be the pivotal point at which we will start to see real change in the way we live our lives. In order for sustainable living to make the change from idea to reality, the approach towards it needs to be holistic. Looking at the increasing amount of participation from various levels of society, perhaps this end goal lies just beyond the horizon.

Students at SKDJ(2) studying under the light of low-illumination bulbs. Source: The StarOnline

These floor mats, made from rubber and rice husk, were salvaged from another building and reused in the school. Source: The StarOnline.

Mr. Nasuruddin started more ambitious projects, like the rainwater harvesting cum fish pond project, and composting using used coffee grounds. In the coming months, Mr. Nasuruddin says there will be 7 more projects to make the school more 'green'.

According to US EPA statistics, commercial agriculture accounts for about 14% of the world's CO_2 emissions. In response to this, many NGOs have promoted organic farming of local produce to mitigate the effects of food production. For Ms. Lili, a resident of TTDI, organic farming is only one of the things she does to reduce her and her family's carbon footprint. She also practices waste separation, composting, and rainwater harvesting. She says she started these practices after learning about them during her stint at HSBC, which held many CSR projects involving the environment. Another TTDI resident, Mr. 'Arif, mentions that he was only curious about how much rainwater he would get from leaving a pot

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KITAR SEMULA:
SATU INISIATIF HIJAU DALAM MENANGANI MASALAH PERUBAHAN IKLIM

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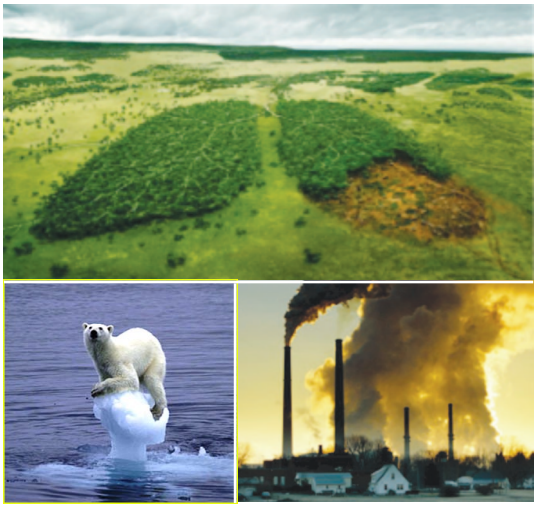
Alam Perlu Dipulihara untuk Generasi akan Datang

Alam ini merupakan anugerah Allah SWT yang tidak ternilai kepada penghuninya. Sudah semestinya kita yang telah diamanahkan sebagai khalifah di muka bumi ini wajib memelihara dan memulihara alam ini dari sebarang kerosakan kerana Allah telah berfirman dalam Surah Al-A'raf ayat 56 yang bermaksud:

"Dan janganlah kamu berbuat kerosakan di bumi sesudah Allah menyediakan segala yang membawa kebaikan padanya, dan berdoalah kepadaNya dengan perasaan bimbang (kalau-kalau tidak diterima) dan juga dengan perasaan berharap-harap (supaya makbul). Sesungguhnya rahmat Allah itu dekat pada orang-orang yang sentiasa memperbaiki amalannya."



Justeru itu setiap daripada kita sebagai anggota masyarakat memainkan peranan yang amat penting agar bumi ini tetap terpelihara demi masa depan bersama. Jangan biarkan bumi yang kita diami rosak dek kerakusan pembangunan. Usah nanti, anak cucu kita tidak lagi mengenal bagaimana rupa hutan dek kepesatan kemajuan yang dikecapi.

Seperti kata-kata Chief Seattle, mantan pemimpin kaum Red Indian Amerika,

"Kita tidak mewarisi bumi kita ini daripada nenek moyang kita, tetapi sebaliknya kita hanya meminjamnya daripada anak cucu kita.....".

Begitulah betapa pentingnya kita menjaga alam sekitar demi mengelakkan kesan buruk kepada generasi yang akan datang.

Pembangunan yang tidak dirancang dengan baik akan menyumbang kepada pemanasan global yang akan mempengaruhi perubahan iklim dunia. Pembuangan sampah yang tidak terkawal, penebangan hutan yang berleluasa, pengurusan sisa toksik yang tidak betul dan pembakaran terbuka akan menyumbang kepada kemusnahan ekologi bumi. Perbuatan ini akan menyebabkan peningkatan kepada suhu dunia yang memberi impak kepada kesan rumah hijau.

Kesan pemanasan global dapat dilihat dalam jangkamasa panjang dan ianya berlaku sedikit demi sedikit di mana alam sekitar mengalami peningkatan suhu yang tinggi walaupun pada waktu malam. Jika tidak dikawal, suhu permukaan bumi akan naik sebanyak 1.10C sehingga 6.40C antara 1990 hingga 2100. Ini akan menyaksikan penurunan pola hujan, pencairan ketulan ais di kutub utara dan selatan, ribut tropika yang teruk dan lain-lain kesan yang akan menggugat kestabilan ekologi bumi.

Jika tidak dikawal dengan sebaiknya, tidak mustahil Malaysia akan tenggelam jika ais di kutub utara cair sepenuhnya di mana kecairan ini akan meningkatkan paras air laut di Laut China Selatan dan Selat Melaka.

Kitar Semula dan Pemanasan Global

Kajian di Malaysia menunjukkan pada tahun 2001, sebanyak 17,000 tan sampah telah dikutip dalam masa sehari di mana angka itu semakin meningkat kepada 19,000 tan pada tahun 2005. Jabatan Pengurusan Sisa Pepejal Negara menjangkakan menjelang tahun 2020, ianya akan bertambah kepada 30,000 tan sampah sehari.

Ini menunjukkan kita telah membuang sebanyak 1.8 juta tan sampah dalam tempoh setahun. Sekiranya ianya tidak diurus dengan baik, longgokan sampah ini boleh memenuhi bandar raya Kuala Lumpur yang mempunyai keluasan 243.65 km^2 dalam masa 3 hari. Sanggupkah kita berdepan dengan situasi begini?

Dalam menangani perubahan iklim ini, pelbagai cara boleh dilakukan. Salah satunya ialah amalan kitar semula. Langkah ini merupakan langkah yang dapat memberi impak yang besar jika mendapat sokongan dari semua pihak. Kitar semula merupakan proses memperoleh atau menjadikan sebahagian atau semua bahan daripada sampah menjadi barang baru yang boleh digunakan semula.

Kitar semula barangan terpakai merupakan satu bentuk inisiatif hijau yang boleh dimainkan oleh industri dan masyarakat umum. Ianya bersesuaian dengan konsep Pengeluaran Bersih yang bukan sahaja menitikberatkan pembaikan berterusan oleh pihak industri ke atas proses, produk dan perkhidmatan, malah turut melibatkan peranan individu dalam masyarakat yang berhubungan dengan industri secara langsung sebagai pengguna barangan dan perkhidmatan.

Di Malaysia, program kitar semula telah dilancarkan sebanyak dua kali iaitu pada tahun 1993 dan 2000. Kementerian Perumahan dan Kerajaan Tempatan (KPKT) telah menetapkan 11 November setiap tahun sebagai Hari Kitar Semula Kebangsaan. Walaupun telah lama dilancarkan, peratusan kejayaan kitar semula di Malaysia amat rendah iaitu hanya 5% berbanding negara maju lain seperti German (74%), Belgium (71%), Austria (67%), Belanda (66%) dan Jepun (50%). Perkara ini amat merugikan dari segi ekonomi negara kerana kerajaan terpaksa mengeluarkan wang yang banyak untuk kerja-kerja pelupusan.

Secara amnya, banyak barangan yang boleh dikitar semula di sekeliling kita. Kertas terpakai, surat khabar, botol, tin dan

plastik merupakan barangan yang sentiasa ada di dalam rumah kita. Barang-barang ini jika diurus dengan baik akan dapat mengurangkan timbunan sampah sarap yang banyak kerana 70% sampah yang dibuang boleh dikitar semula.

Sebagai contoh, setiap tan kertas yang dikitar semula sebagai paperboard untuk tujuan pembungkusan dan lain lain kegunaan mampu mengelakkan sebanyak 3.6 juta tan metrik emisi Karbon Dioksida (CO_2). Kitar semula kertas mengurangkan emisi gas-gas rumah hijau yang menyebabkan pemanasan global kerana :

i. Kitar semula kertas mencegah emisi gas methana dari tapak-tapak pelupusan sampah.

Apabila kertas tidak dikitar semula , lebih kurang 80% daripada kertas tersebut akan berakhir di tapak pelupusan sampah. Proses pereputan kertas di tapak pelupasan sampah menghasilkan gas methana, iaitu gas rumah hijau yang kuasa memerangkap habanya adalah 21 kali ganda kuasanya berbanding gas karbon dioksida (CO2). U.S. EPA telah mengenalpasti tapak pelupusan sebagai satu-satunya punca penghasilan gas methana terbesar di Amerika Syarikat, dan pereputan kertas adalah penyumbang terbesar gas methana yang dihasilkan.

ii. Kitar semula kertas memerlukan tenaga yang kurang.

Proses pembuatan kertas daripada kertas yang dikitar semula memerlukan kurang tenaga berbanding pembuatan kertas dari kayu pokok. Pengeluaran paperboard yang dikitar semula 100% menggunakan 50 peratus kurang tenaga berbanding paperboard yang dibuat dari kayu pokok. Ini seterusnya, mengurangkan dengan banyaknya gas rumah hijau yang dibebaskan ke atmosfera.

Selain dari kertas, beg plastik juga merupakan salah satu buangan yang banyak dilupuskan di tapak pelupusan sampah di seluruh dunia termasuk Malaysia. Secara amnya, lebih kurang 500 billion ke 1 trillion beg plastik digunakan serata dunia di mana beg plastik ini akhirnya akan menjadi sampah dan memerlukan 500 tahun untuk diurai. Proses pembuatan plastik pula menggunakan banyak tenaga di mana pihak kilang membakar banyak bahanapi untuk menghasilkan plastik bagi memenuhi permintaan pengguna.

Pembakaran bahanapi fosil adalah sangat mencemar alam sekitar kerana ianya menghasilkan gas karbon dioksida (CO_2) yang merupakan penyebab utama kepada pemanasan global. Pengeluaran 1 kg polyethylene (PET or LDPE) memerlukan 2 kg bahanapi untuk tenaga dan bahan mentah. Polyethylene (PET) merupakan bahan plastik yang paling banyak digunakan untuk pembuatan beg plastik. Sementara itu, pembakaran 1 kg bahanapi pula menghasilkan lebih kurang 3 kg karbon dioksida. Secara mudah, bagi setiap kg plastik sebanyak 6 kg karbon dioksida dihasilkan semasa proses pengeluaran dan pembakaran.

Jika penggunaan beg kitar semula menjadi amalan harian ketika membeli belah, kita telah berjaya mengurangkan penggunaan 6 beg plastik sehari. Jika hanya seorang dari 5 orang di Malaysia mengamalkan amalan ini, kita telah berjaya mengurangkan sebanyak 110,822,400,000 beg. Bayangkan berapa banyak wang dapat dijimatkan dan berapa banyak penghasilan gas rumah hijau yang dapat dikurangkan?

Selain itu, syarikat-syarikat pengeluar barangan atau produk juga perlu memainkan peranan mereka dalam menangani masalah pemanasan global. Langkah yang dilakukan oleh Fuji Xerox Co Ltd patut dicontohi. Mereka menggunakan Sistem Kitaran Semula bagi menghasilkan mesin pencetak dan salinan mesra alam. Melalui sistem ini, mesin pencetak pelbagai guna lama atau terpakai yang diperolehi daripada pengguna akan dikenalpasti keadaannya sebelum dikitar semula menerusi sistem Kitaran Tertutup Fuji Xerox. Produk-produk ini diperoleh daripada sembilan buah negara termasuk Malaysia dengan kadar kitaran sebanyak 99.1%.

Walaupun produk ini dibuat daripada barangan kitar semula, tetapi mereka memastikan bahawa produk itu mempunyai kualiti terbaik. Maka tidak mustahillah jika pada Ogos 2000, Fuji Xerox menjadi syarikat pertama di Jepun yang berjaya mencatatkan bahan buangan pepejal sifar. Usaha ini diluaskan lagi ke Thailand sehingga tiada sisa bahan buangan pepejal dilaporkan.

Lestarikan Kitar Semula Demi Masa Depan Bersama

Sebagai masyarakat yang prihatin, kita perlu menjadikan amalan kitar semula ini sebagai amalan seisi keluarga. Dengan kitar semula, kita dapat menjimatkan penggunaan sumber asli dan tenaga sekaligus dapat menyelamatkan bumi kita.

Kitar semula memainkan peranan yang amat besar dalam memastikan bumi yang kita diami terpelihara dan terpulihara sekaligus dapat menangani masalah perubahan iklim dunia. Justeru itu, setiap daripada kita perlu memainkan peranan yang lebih aktif demi memastikan kelestarian bumi akan terlaksana.

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THE IMPORTANCE OF OCEAN IN CONTROLLING GLOBAL CLIMATE CHANGE – The Perspective of CO_2 Biological Pump

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Oceans are Earth's huge water reservoir that plays important roles in the hydrological system and influences every phase of Earth's dynamics. 70 percent of the Earth's surface is cover by oceans thus making them essential in controlling Earth's climate and in global warming. Human extreme burning of fossil fuels and land use in driving the worlds to better life has cause an increase of carbon dioxide concentration in atmosphere. From the estimated input of CO_2, it is less than 60% are present in the atmosphere. It is because the ocean is found to be taking up the CO_2 in the atmosphere at a rate of 2 gigatons per year (one gigaton of CO_2 equals 1015 grams of carbon). The estimated CO_2 sinks in oceans for 1980-1989 was 2.0±0.6 gigatons carbon per year (Gton C/year). About 244±20 Pg C was emitted into the atmosphere due to fossil fuels burning and cements production such as shown in Table 1. About two-thirds of these emission remained in atmosphere thus increasing atmospheric CO_2 concentration from 281 ± 2 ppm in 1800 to 359 ± 0.4 ppm in 1994 which results in total increase of 165 Pg C. Considering the oceans uptake and storage of CO_2 rate at about 118 ± 19 Pg C and the terrestrial biosphere of 39 ± 28 Pg C from 1800 and 1994 such as in Table 1. It is concluded that the ocean is the only true net sink for anthropogenic CO2 for the past 200 years. Significantly, without the oceans role as CO_2 sinks, the atmospheric CO_2 would be about 55 ppm higher today that it was observed before.

CO_2 sources and sinks	1800 to 1994 (Pg C)*	1980 to 1999 (Pg C)¶
Constrained sources and sinks		
(1) Emissions from fossil fuel and cement production	244† ± 20	117 ± 5
(2) Storage in the atmosphere	−165‡ ± 4	−65 ± 1
(3) Uptake and storage in the ocean	−118§ ± 19	−37 ± 8
Inferred net terrestrial balance		
(4) Net terrestrial balance = [−(1) − (2) − (3)]	39 ± 28	−15 ± 9
Terrestrial balance		
(5) Emissions from land-use change	100 to 180‖	24 ± 12
(6) Terrestrial biosphere sink = [−(1) − (2) − (3)] − (5)	−61 to −141	−39 ± 18

Table 1: Anthropogenic CO_2 budget (1800-1994) and for the decades of the 1980s to 1990s (Sabine et al., 2004)

Biological Pump

Biological pump is a process of fixation of inorganic carbon in organic matter which involves marine organism as main catalyst and also involved other processes such as transformation by food web processes, physical mixing, transport and gravitational sinking (Figure 2). The largest and most understood reactive carbon is dissolved inorganic carbon (DIC) about 38,000 x 1015 g C. Based on Figure 4.2, it is shown that biological pump actually involved the transformation of DIC into organic biomass and pumping it into deep ocean in the form of particulate or dissolved form. Initially, CO_2 from the atmosphere and other trace elements such as N_2 are fixed by phytoplankton which involves photosynthesis process thus releasing dissolved organic matter (DOM). It is also stated that the second largest and least understood is DOM about 685 x 1015 g C. In addition, phytoplankton also being consumed by herbivorous zooplankton and nekton (Figure 3) such as Copepods, Amphipod, Euphausiid and Sergestid shrimp thus producing sinking fecal pellets which can reingested and sink or forming larger sinking aggregates. These herbivorous zooplankton and nekton migrate vertically from surface ocean water which moves upward into surface water during night to feed and eventually moves downward again before dawn. This vertical migration of zooplankton and nekton are important because they increase the export of organic material by ingesting surface-ingested material in their digestive system to deep water and metabolized the organic material. Other factor that also influenced the transportation and assimilation of organic biomass into deep waters are zooplankton molting or mortality from predation. Besides that, DOM is also partially taken up by bacteria and respired which the remaining DOM is mixed into deep sea where about 1% of it's at seabed and consumed. Carbon is stored for millions of years where they only returned back to the surface by thermohaline circulation which involves a very long timescales.

Ocean huge water reservoir and long-term interaction between the ocean and atmosphere play an integral part in

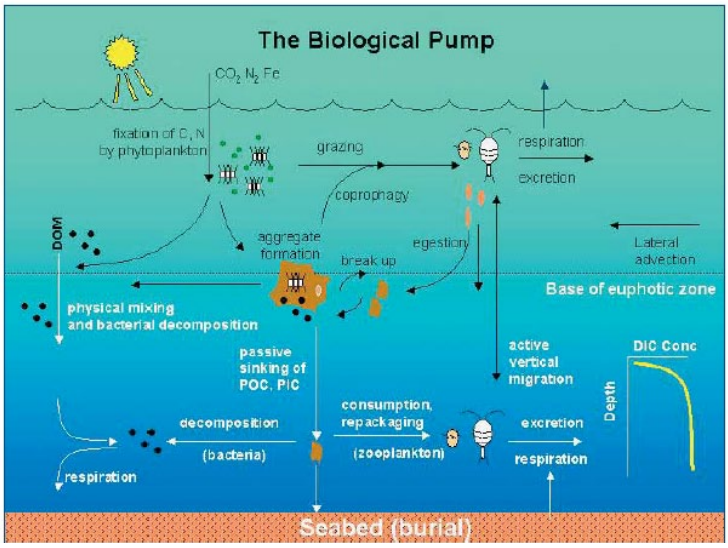

Figure 2: Components of biological pump from surface water into deep ocean seabed (Ducklow et al., 2001)

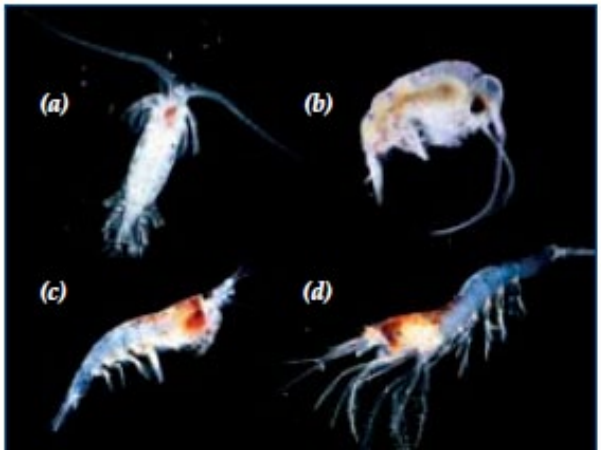

Figure 3: Commonly found vertical migrating zooplankton and nekton. a) Copepod; b) Amphipod; c) Euphausiid; and d) Sergestid shrimp (Ducklow et al., 2001)

controlling climate change. Ocean also acts as giant reservoir for carbon which they up taking large amount of CO_2 from atmosphere. The uptake of CO_2 from atmosphere across the ocean surface is due to many factors and of them are the biological and gravitational factors that also help to pump this CO_2 in the form of inorganic carbon into the deep sea. The role of ocean is very important to understand and to be preserved in order to reduce the effect of climate change. Without the role of ocean in controlling the anthropogenic releasing of CO_2 concentration in atmosphere, the temperature of the atmosphere will be increasing and induced global warming. Therefore, it is critical to not acting business as usual and takes positive initiative to stop anthropogenic releasing of CO_2 from the source and emphasizing the study to help conserve the role of ocean in controlling climate change. Further study, observation and collecting data should be continue and it is necessary to include the role of ocean in future climate change mitigation and adaptation strategies.

ULASAN BUKU "POLLUTION PREVENTION: Methodology, Technologies and Practices"

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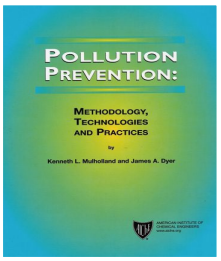

Pencegahan pencemaran mula dikenali dan popular pada tahun 1990an di mana kaedah atau teknologi bagi mengurangkan buangan dan emisi dari proses kimia dilaksanakan bagi menjadikan premis industri lebih mesra alam sekitar. Pelbagai terma atau istilah lain telah digunakan bagi merujuk perkara ini seperti pengurangan buangan, pengurangan di punca, teknologi bersih, dan pembuatan hijau. Namun apa yang pasti, cabaran bagi melaksanakan perubahan-perubahan kepada proses kilang bagi mengurangkan penjanaan buangan kadang kala agak membebankan. Jurutera dan saintis berkenaan berhadapan dengan halangan dan masalah seperti teknologi, ekonomi dan sosial dalam membentuk dan melaksanakan program pencegahan pencemaran di premis masing-masing.

Buku terbitan American Institute of Chemical Engineers ini sangat bermanfaat sebagai rujukan kepada jurutera dan saintis, malah perunding alam sekitar yang mula menceburi bidang pencegahan pencemaran alam sekitar sebagai satu langkah untuk mengurangkan pencemaran dari premis-premis industri. Buku ini mengetengahkan metodologi bersama amalan dan teknologi kejuruteraan yang terbukti keberkesanannya dalam mengurangkan penjanaan buangan di punca dan seterusnya mencegah pencemaran alam sekitar.

Fokus metodologi ialah kepada mengenalpasti amalan-amalan dan teknologi-teknologi kejuruteraan pencegahan pencemaran yang akan mengubah apa yang berlaku dalam sistem perpaipan dan vessels sesuatu proses pembuatan, bukannya tertumpu kepada perubahan mudah atau kosmetik kepada prosedur pemprosesan. Contoh yang menarik ialah "10-Step Method for Engineering Evaluations of Pollution Prevention Methods," di mana penulis telah membahagikan kaedah kepada langkah-langkah mudah seperti mendefinasikan masalah, menetapkan matlamat yang hendak dicapai, serta mengenalpasti, menentukan dan menilai strategi-strategi altenatif bagi setiap permasalahan kilang.

Sebagai tambahan, buku ini juga menyediakan teknik-teknik dan alat-alat (*tools*) untuk menangani kekangan-kekangan hinggalah kepada kaedah pelaksanaan penyelesaian dan pembentukan program pencegahan pencemaran yang berterusan di setiap tahap proses pembuatan di kilang. Kaedah atau metodologi ini telah dilaksanakan dengan jayanya di kilang Du Pont di Amerika Syarikat. Amalan-amalan dan teknologi-teknologi kejuruteraan pencegahan pencemaran yang dibentuk hasil dari penilaian terhadap beratus-ratus kajian kes spesifik proses dari pelbagai industri, telah disusun dengan baik sebagai pelengkap kepada metodologi yang digunakan. Pangkalan maklumat ini menyediakan asas rujukan yang berguna kepada jurutera dan saintis bagi mengenalpasti dengan cepat terhadap perubahan-perubahan yang boleh dilakukan kepada proses kilang bagi mengurangkan penjanaan buangan dan emisi.

Satu ungkapan yang menarik dari buku ini bagi menggambarkan keadaan sebenar program pencegahan pencemaran dan boleh dijadikan panduan atau rujukan semua yang terlibat dalam pengurusan alam sekitar ialah;

Peningkatan proses tidak memerlukan teknologi baru, cuma pemahaman dan penggunaan teknologi sediada dengan lebih baik. Ianya meliputi semakan penilaian dan pembaikan terhadap prosedur operasi hinggalah kepada pengubahsuaian proses yang boleh dipatenkan.

Private Sector Initiatives in **Harvesting Green Energy at Pajam, Negeri Sembilan**

On the 5th of December 2012, the Department of Environment (DOE) organized an educational visit for members of the Working Group for Greenhouse Gas (GHG) Inventory on Waste Sector to Integrated Renewable Energy Park and Chicken Manure Biogas Renewable Energy Project in Pajam, Negeri Sembilan.

The visit was led by Pn. Hajah Kalsom Abd. Ghani, the Director of Air Division in DOE also acting as the chairman of theWorking Group Committee for GHG Inventory on Waste Sector. The objectives of the educational visits were:

To learn about the technical aspects involved in generating renewable energy such as solar panel and biogas plant; and

To engage with the person involved in renewable energy industries and to promote generation of renewable energy and enhance cooperation with the industries

The Integrated Renewable Energy Park in Pajam is a project under Cypark Resources Berhad. The company has developed expertise to generate renewable energy on remediated solid waste disposal sites, turning them into integrated renewable energy park where landfill gas and solar are harnessed to produce sustainable green energy. The integrated renewable energy park is currently supplying electricity to 10,000 houses in Pajam area with the capacity of 8 MW solar power. It is reported that this integrated renewable energy park could reduce CO_2 emission by 30,000 kg a day. For future expansion, it is expected to provide sustainable green energy to power approximately 20,000 houses with its total capacity of 15 MW (13 MW solar power and 2 MW biogas).

The Chicken Manure Biogas Renewable Energy Project is a project being developed under QL Resources Berhad at their poultry farm. This project encompasses biogas plants that process the waste (chicken manure) and convert it into energy. This project will benefit the environment by minimizing odour problem from the farms's daily chicken manure, while it is estimated to generate up to 500 kW of green electrical power from the process.

Figure 1: Solar panel used to harness sustainable green energy at Integrated Renewable Energy Park, Pajam, Negeri Sembilan.

Figure 2: Working Group Committee Member for Greenhouse Gas (GHG) Inventory on Waste Sector at Integrated Renewable Energy Park, Pajam, Negeri Sembilan.

Figure 3: Working Group Committee Member for Greenhouse Gas (GHG) Inventory on Waste Sector at Chicken Manure Biogas Renewable Energy Project, Pajam, Negeri Sembilan.

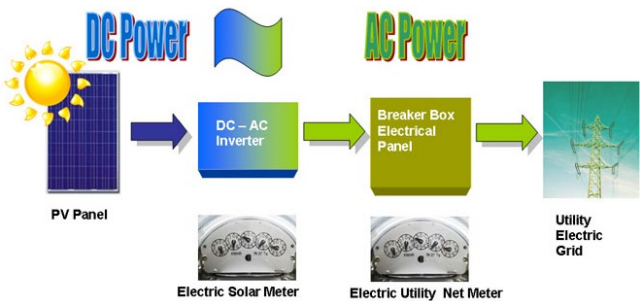

Figure 4: Flow diagram of solar power process at Cypark Integrated Renewable Energy Park, Pajam, Negeri Sembilan.

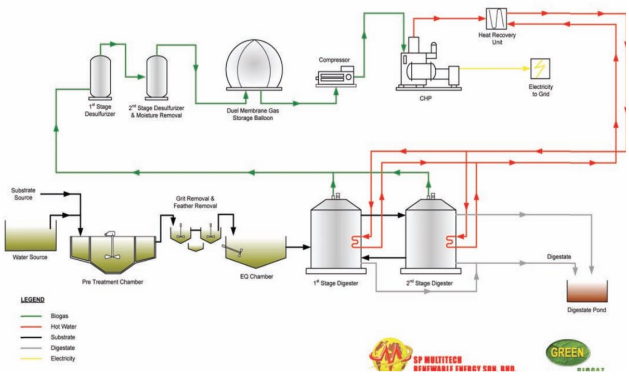

Figure 5: Flow diagram of biogas energy generation process at Chicken Manure Biogas Renewable Energy Project, Pajam, Negeri Sembilan

KURSUS PENGENALAN DAN APLIKASI PENGELUARAN BERSIH, 8 – 12 APRIL 2013

Unit Industri Hijau (UIH), Jabatan Alam Sekitar telah mengadakan Kursus Inisiatif Industri Hijau iaitu Kursus Pengenalan dan Aplikasi Pengeluaran Bersih pada 8 – 12 April 2013 bertempat di Hotel Aston, Nilai. Kursus selama 5 hari ini telah dihadiri oleh seramai 25 pegawai JAS daripada Ibu Pejabat dan JAS negeri di seluruh Malaysia. Kursus ini diadakan untuk memberi latihan kepada pegawai JAS mengenai konsep serta pelaksanaan Pengeluaran Bersih (CP) di industri. Kursus ini merupakan kursus asas yang wajib diikuti oleh pegawai JAS dalam usaha mengkompetenkan mereka dalam bidang CP atau sebagai Juruaudit CP. Aktiviti kursus ini merangkumi pembelajaran dalam kelas seperti kuliah, perbincangan dan latihan dalam kumpulan dan kajian kes. Selain daripada itu, satu lawatan ke premis industri telah diatur sebagai latihan praktikal di lapangan supaya pegawai dapat menjalankan aktiviti audit CP di premis tersebut dan membentangkan hasil audit dalam kelas sebagai tugasan berkumpulan.

BENGKEL KHUSUS PENGELUARAN BERSIH, 17 – 21 JUN 2013

Lanjutan daripada Kursus Pengenalan dan Aplikasi Pengeluaran Bersih yang telah diadakan, satu bengkel iaitu Bengkel Khusus Pengeluaran Bersih telah diadakan di Hotel Quality, Shah Alam pada 17 – 21 Jun 2013. Peserta yang mengikuti kursus ini merupakan pegawai yang telah menghadiri Kursus Pengenalan dan Aplikasi Pengeluaran Bersih sebelum ini. Objektif utama bengkel ini ialah menyediakan pegawai dengan kemahiran khusus dalam membuat pengiraan imbangan jisim dan tenaga yang mana kemahiran ini sangat diperlukan apabila pegawai mengikuti Program Kompetensi Audit Pengeluaran Bersih kelak. Dalam bengkel ini, pegawai telah diajar untuk menjalankan imbangan jisim dan tenaga bagi mengira atau menganggar penggunaan atau kehilangan bahan dan tenaga bagi sesuatu proses di premis. Selain itu, pegawai juga diberi kemahiran bagaimana untuk menjana opsyen-opsyen CP yang sesuai dengan menggunakan kaedah yang sistematik berdasarkan kepada maklumat yang diperolehi daripada audit CP di premis. Opsyen-opsyen yang dijana akan dapat membantu pihak premis untuk menilai peluang bagi melaksanakan CP di premis dan seterusnya meningkatkan premis mereka kepada status industri hijau.

PROGRAM KOMPETENSI AUDIT PENGELUARAN BERSIH

Program Kompetensi Audit Pengeluaran Bersih Zon Selatan,
20 – 23 Mei 2013
Premis: Perusahaan MAZ Sdn. Bhd., Johor

Program Kompetensi Audit Pengeluaran Bersih Zon Timur,
3 – 6 Jun 2013
Premis: TD Poultry Sdn. Bhd., Terengganu

Program ini merupakan program yang perlu diikuti oleh pegawai JAS dalam usaha untuk mengkompetenkan mereka sebagai Juruaudit CP Jabatan. Program ini dirancang akan diadakan sebanyak 5 kali pada tahun ini dan dibahagikan kepada 5 zon iaitu Selatan, Timur, Tengah, Utara dan Borneo. Setiap zon akan dihadiri oleh 5 - 6 orang pegawai JAS yang telah mengikuti Kursus Pengenalan dan Aplikasi Pengeluaran Bersih. Pada tahun ini, sehingga Jun 2013, UIH telah berjaya menjalankan program ini di Johor Bharu bagi Zon Selatan dan di Kuala Terengganu bagi Zon Timur. Seramai 11 orang pegawai JAS telah dikompetenkan bagi Tahap 2 - Audit Pengeluaran Bersih.

Dalam program ini, pegawai dikehendaki menjalankan audit CP di kilang yang telah ditetapkan dan seterusnya perlu menyediakan laporan untuk menjadikan mereka pegawai yang kompeten dalam melaksanakan audit CP di kilang. Pegawai perlu menyiapkan laporan tersebut dan menyerahkannya kepada UIH pada hari terakhir program untuk dinilai. Kaedah penilaian yang digunakan ialah penilaian laporan audit dan ringkasan audit yang mengandungi sekurang-kurangnya sepuluh (10) opsyen CP yang sesuai bagi premis yang diaudit. Opsyen CP yang dijana akan turut dinilai kebolehlaksanaannya dalam aspek ekonomi dan pengurangan penghasilan jejak karbon (*carbon footprint*). Pegawai juga akan dinilai berdasarkan pengetahuan mereka semasa temubual bersama penyelaras program. Jabatan Alam Sekitar ingin merakamkan setinggi-tinggi penghargaan kepada Perusahaan MAZ Sdn. Bhd. dan TD Poultry Sdn. Bhd. atas kerjasama yang telah diberikan dalam menjayakan program ini bagi Zon Selatan dan Zon Timur.